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FORESTRY AS A PROFESSION

By Edw. A. Sherman

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FOREST SERVICE

FORESTRY AS A PROFESSION

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Forestry as a profession requiring special training and instruction was first given recognition by an American institution of learning no longer ago than 1898, when Cornell University established a professional school of forestry. The ideals and purposes of the new profession were necessarily in conflict with many long-established customs and practices and consequently encountered opposition. Gradually, however, as misunderstandings were cleared up and prejudices overcome, its field of usefulness became more and more apparent. During the past two decades the profession has made remarkable progress and has taken a position of great economic importance. To-day forestry is a recognized profession charged with the solution of what is perhaps our greatest economic problem, that of putting to the best use 470,000,000 acres of forest land.

When active work in forestry first began there were no forest schools in this country, and prospective foresters had to go to Europe to obtain technical training. In anticipation of the need for foresters, and in order to aid in the development of forestry, several progressive institutions established schools of forestry even before any considerable demand for foresters was assured. The establishment of the School of Forestry at Cornell was followed, in 1900, by the opening of the Yale Forest School. As early as 1897 private instruction in forestry was given at Biltmore, N. C., by Dr. C. A. Schenck in connection with his work on the Vanderbilt estate, and in 1903 a school for rangers was started at Mont Alto, Pa., by the State of Pennsylvania. To-day 23 institutions give courses leading to a degree in forestry, and 50 others include forestry in their curricula. In 1912 it was estimated that, in addition to forest rangers who began without a knowledge of the technical side of forestry but many of whom through their experience in National and State work under technical direction had acquired considerable knowledge of certain phases of the subject, there were 500 men in the United States with a greater or less degree of technical forestry training. To-day in addition to forest rangers, of whom the number with technical training is increasing, there are 1,630 technically trained men in the Forest Service alone. A recent inquiry reveals that there are more than 1,500 young men studying in the forest schools.

Although forestry is now firmly established as a profession, many people still have only a vague idea of the kind of life the forester really leads. Many young men are attracted to it because it is an outdoor profession. They are fond of camping in the woods, of hunting and fishing, and the prospect of being able to spend a part of each year in the woods in connection with their regular work seems very alluring. Such men should remember, however, that the forester in his field work seldom enjoys the comforts to which the ordi-

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nary sportsman is accustomed, and that spending considerable time in the woods as part of one's regular business is quite different from camping out for a few weeks on a vacation.

Anyone who plans to take up forestry should realize that his work is to be principally in the woods, often under trying conditions, and that it demands strenuous physical labor. He must expect to spend most of the period of his apprenticeship in field work, and as the number of foresters increases and competition becomes more intense this period may be expected to lengthen.

As is the case with civil engineers, the young forester is apt to have his headquarters shifted frequently from place to place, and the places may not be desirable. Because of this shifting about he may be unable for some time to establish a home. On the other hand, if he is an able man, he will ultimately be advanced to a position of responsibility which will give him more permanent headquarters and a greater opportunity for home life. Even in the higher positions, however, whether in Government or in private work, the forester will be obliged to spend a great deal of time in supervising or inspecting the actual woods operations on the ground. In the aggregate he will usually spend from 40 to 60 per cent of his time in the woods, mainly on short trips of from one to six weeks, and the rest of his time in the office. His home will ordinarily be in a small town or its vicinity, with but little opportunity for city life. Even here he must not count himself secure against a change of working field which will necessitate removal to a new place.

To one who enjoys a life of this sort, the profession is fascinating; to one who does not, the work soon becomes monotonous and even positively disagreeable.

The character of the work which foresters are called upon to do varies greatly. Some men spend the greater part of their time in the more technical work of the profession. They determine the amount and rate of growth of the timber on a given tract, work out the best methods of cutting to obtain a second crop without recourse to planting, and in general study all kinds of problems having to do with the life history and the productive capacity of the forest. Other men spend more time on the business end of the profession—in devising methods for protecting the forest from fire, in organizing an efficient system of administration, in determining the cheapest and most effective methods of lumbering, and in dealing with the problem of the utilization of the forest.

By far the greater number of foresters, however, have to deal with both the scientific and the business aspects of the profession. They must know how to appraise timber and how to utilize it in the best possible way, as well as how to grow it. They must be able to estimate the cost per thousand feet of logging a given tract of timber at the same time that they predict how soon the same area can be cut over a second time with profit. In other words, the forester must usually be a good business man with a thorough technical education. He must be able to manage and develop the property in his care so as to make it yield increasingly heavy returns at lower cost. The scientific equipment is a matter of thorough schooling; the business equipment must be gained through practical experience in woods work.

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After industry, honesty, and soundness of character, the most important requisites for success as a forester are a liking for the sort of life which the forester has to lead and the health and constitution to stand it. The forester's work is physically exacting. He has to make long, hard trips in the forest, and even with the greatest probable extension of good roads much of his travel for many years to come will necessarily be rough. Doubtless the time will never come when it will all be easy. As yet travel in the forest often means long, hard trips on horseback, often it means very hard and rough walking, and sometimes slow and laborious progress by snowshoe or canoe. The forester is not infrequently subject to actual physical hardships, and in any event he must have the constitution to endure such hardships should the occasion arise.

It must not be understood from this, however, that the profession is a muscular one, pure and simple. It requires brains, and brains of a high order, particularly at the present stage of the profession in this country, when nearly every forester is doing distinctly constructive and pioneer work. The successful forester must have to a high degree the qualities of foresight and broadmindedness, and these must be supplemented more and more, as the work becomes better organized, by a thoroughness in details. The man who is capable only of carrying out somebody else's plans will always, as in other professions, remain an assistant.

Administrative and executive ability is necessary. The forester's work is extremely practical, and is either directly or indirectly concerned with the practical business administration of property. As soon as he passes beyond the stage of being a mere assistant he has charge of men, and to be successful must have the ability to understand and to manage them. This applies particularly, of course, to the forester engaged in administrative work, as are most of the foresters in this country at present. Even in the strictly investigative field where the forester has no large administrative responsibility he is doing work which is essential for the proper handling of the forest, and he must be thoroughly practical if his investigations are to be of value in bringing about better methods of forest management.

Many foresters must also have those qualities which make the successful public teacher. Nearly every forester, whether consciously or not, is helping to mold public sentiment, and in many positions educational work is a part of his regular duties.

One of the most important requisites for success is the spirit of public service. The conservation of our natural resources is to-day the greatest internal problem of the Nation, and forestry touches the conservation of all our natural resources. Every forester is doing a work which directly benefits the public. It has been a difficult task to accomplish what has been done in forestry. It will be a more difficult one to carry the work to completion. The public forester has many obstacles to overcome, but his opportunities for public service are correspondingly great. It is the spirit of public service which has kept in Government forest work many men who have repeatedly received and refused offers of private work at much higher salaries than they are receiving from the public.

A final requisite for success in forestry, as in any other profession, and one which can not be overestimated, is a fundamental and

thorough training for the work. As the number of foresters in the country steadily increases and competition becomes more keen a thorough education is becoming more and more a necessity.

The thoroughly trained technical forester should have an education equivalent to that of any other well-trained professional man, such as a lawyer, doctor, or civil engineer. Such an education can not ordinarily be obtained in less than four years of college work. A course of five or six years, one or two of which are spent in post-graduate work, is still better. There are now many well-equipped forest schools in this country, offering both undergraduate and post-graduate work, and the average man can not hope to be successful without a complete course in one of these schools. For the large number of men who look for employment in the lumbering business or other forest-using industries a thorough training in the principles of forestry, through four or five years of college work, is as necessary as in the case of men who plant to specialize upon the more scientific and technical sides of the profession. College training, however, is but a part of the preparation needed. It must be supplemented by first-hand experience in the woods. Many young foresters obtain a part of this experience through summer-school camps, but an increasing number are getting it through field work during the summer-vacation period either in some Federal or State forest organization or in the employ of some lumber company. For those who plan to specialize in lumbering, several years of hard work in the woods, in logging camps, and in the mill to learn the practical details of the business are necessary.

Postgraduate work in Europe is no longer essential. Conditions in this country are so different from those in Europe that many of the methods commonly used there are wholly impracticable here. However, European forestry has so much to show in the way of results accomplished after centuries of effort that careful study of these results can not fail to have a broadening influence on the American forester or to inspire him with many ideas that will be of great practical value in his work.

THE FIELD OF WORK

Foresters are now finding ready employment with the Federal Government, with the States, some of which have extensive forestry departments, with municipalities, with lumber companies and private owners of timberland, with wood-using industries, with educational institutions, and with organizations conducting research in forestry.

GOVERNMENT WORK

Up to the close of the first decade of the century the United States Government was the principal employer of American foresters. In 1912 it was officially estimated that 60 per cent of the foresters in the country were in Government work and that fully 95 per cent had been so engaged at one time or another. All that is now changed. The Government continues to employ a great many trained foresters and the percentage of trained men in its ranks is steadily increasing, but outside demands have grown so rapidly that now only a minority of graduate foresters enter Government work as a career. States,

municipalities, educational institutions, and private corporations usually offer more attractive salaries. However, the wide field of the Government's forestry activities in handling forest lands, in research, and in cooperative and extension work will continue to have a public-service appeal by which some of the best talent in the profession will always be attracted. While most of the professional foresters in Federal Government employ are in the Forest Service, a small group of foresters is employed in the management of forest lands in Indian reservations under the Office of Indian Affairs of the Department of the Interior. Foresters are also employed in the National Park Service of the Department of the Interior and in the Income Tax Unit of the Treasury. In the Bureau of Entomology and the Bureau of Plant Industry of the Department of Agriculture are employed foresters with additional training in forest pathology and entomology.

HOW THE FOREST SERVICE FORCE IS RECRUITED

All permanent positions in the Forest Service are in the classified civil service. The main force is recruited through two civil-service examinations—the junior forester and the forest-ranger examinations. The first is highly technical and requires a training equivalent to that given at the best forest schools. The ranger examination is more practical, requiring field training and experience, together with some knowledge of several phases of technical forestry. Men who pass the junior forester examination are eligible to appointment as forest rangers without additional examination.

In the early days of the Forest Service the ranger was not called upon to do the technical work of a professional forester and did not need so much technical knowledge. This situation is gradually changing to meet the requirements of the times. Many ranger positions to-day are being filled with technically trained foresters selected from among those who have passed the civil-service examination for the position of junior forester. For a number of years several forest schools, particularly in the Western States, conducted short courses of two or three months for training forest rangers. Such courses assisted materially in helping to meet the emergency needs of putting a very great area of public forests under protection and administration. However, it is becoming more and more evident that a thorough training in forestry is requisite to success even in the ranger positions, and it will soon be possible to fill most of the vacancies in the ranks with men having such educational equipment.

Specialists for technical positions in a number of other lines of work are recruited by special civil-service examinations—among them lumbermen, land examiners, forest ecologists, engineers in timber tests, chemical engineers, and wood technologists.

The important executive and administrative positions in the Forest Service are filled by promoting men who have shown special merit. Most of the forest supervisors and assistant supervisors are men who have been promoted from the position of junior forester or forest ranger. The primary object in the appointment to positions as rangers of men who pass the junior forester examination is to enable these men to supplement their academic training by actual work and experience which will qualify them for the responsibility

of managing a ranger district, or a timber sale project, or of carrying on grazing administration, silvical research, or comparable work. By this plan opportunity is afforded at the beginning of each man's career to become thoroughly grounded in the practical aspects of managing national forest lands.

The length of time a technically trained man needs to spend in one of these training positions depends on the man and his previous experience. The average forest-school graduate should expect to spend from one to one and one-half years in the training position to which he is first assigned. Field training equivalent to that contemplated in one of these positions and which qualifies the new appointee for an immediate assignment to a higher grade is recognized by such higher assignment at once or as soon as the vacancy occurs. The rapidity of advancement is limited by individual qualifications in all cases.

POSITIONS AND SALARIES IN THE FOREST SERVICE

With the exception of the Chief Forester the range of salaries in the higher administrative and investigative positions in the Washington and district headquarters offices is from $3,800 to $6,000 a year.

The national forests are grouped in three classes, according to the nature and size of the problems and responsibilities devolving upon the officers in charge. The forests of least importance with respect to problems and responsibilities are in class 1, those of intermediate importance in class 2, and those of highest importance in class 3. The number of forests under separate administration in each class is as follows: Class 1, 6; class 2, 89; class 3, 50. In some instances a number of small forests, such as those created on military reservations, are grouped together and administered as one forest. The ranges of compensation in administrative positions in the several classes of forests are as follows: Supervisors, class 1, from $2,700 to $3,300; class 2, from $3,000 to $3,600; and class 3, from $3,300 to $3,900 a year. Assistant supervisors, class 1, from $2,100 to $2,700; and classes 2 and 3, from $2,400 to $3,000 a year. On class 2 and class 3 forests having two assistant supervisors the second positions are in the $2,100 to $2,700 range.

The salaries of junior foresters (formerly forest assistants) and junior range examiners (formerly grazing assistants) employed on strictly technical work range from $1,860 to $2,400 a year. A limited number of men having the requisite qualifications are appointed directly from the register as junior foresters or junior range examiners at salaries ranging from $1,860 to $2,400 a year for assignment to forest experiment stations, forest-products research, and grazing investigations, to take charge of timber or grazing surveys, or to fill other specialized positions for which qualified men already in the organization are not available. In all but these exceptional cases men who pass the junior professional examinations are appointed as rangers when vacancies occur.

The allocations of employees in the ranger positions are as follows:

Senior forest ranger: $2,000 to $2,400 a year, with deduction if quarters are furnished, amounting ordinarily to $120. This class includes men holding district ranger positions on districts where the work or problems are especially great or complicated, requiring

special ability and usually at least two years' experience, and men holding positions involving important timber-sales work, usually with supervision of other men.

Forest ranger: $1,800 to $2,040 a year, with deduction if quarters are furnished. This class includes men holding district ranger positions, except those allocated to the senior forest ranger grade and rangers in charge of important timber-sale work, usually not involving the supervision of other men. Ordinarily at least one year's experience as assistant ranger is required.

Assistant forest ranger: $1,620 to $1,860 a year, with deduction if quarters are furnished. This class includes assistants to district rangers or timber-sale rangers not in charge of important sales or groups of sales.

Timber-sale areas, as well as ordinary administrative ranger districts, are classed as "ranger" districts; and men in charge of either class of area, short of the chief lumberman grade, ordinarily have the title of forest ranger or senior forest ranger, as specified in the foregoing paragraphs.

DIVISIONS OF FOREST-SERVICE WORK

The work of the Forest Service may be divided into three parts. First, the protection, administration, and development of the national forests; second, research or technical investigations; and third, extension work, including cooperation with the States and private owners in furthering better forestry practice. The extension activities are grouped administratively under the general term of "Public relations."

PROTECTION, ADMINISTRATION, AND DEVELOPMENT OF NATIONAL FORESTS

The national forests on June 30, 1926, covered a total net area of 158,759,210 acres—21,343,172 acres in Alaska, 132,411,099 acres in the public-land States west of the Mississippi River and chiefly in the mountains of the far West, 1,117,868 in Minnesota and Michigan, and 3,887,071 in the Eastern States, principally in the White Mountains of New Hampshire, in northwestern Pennsylvania and the southern Appalachians, and in Florida and Porto Rico.

The protection, administration, and development of this vast area, including approximately 600,000,000,000 feet of standing timber of merchantable size and species, constitute the greatest task of the Forest Service and occupy the time and energies of most of its men. The management of these real properties markedly distinguishes the work of the Forest Service from that of most Government bureaus. Its practical requirements have been met by a highly decentralized form of administration whereby the responsibility for handling local problems has been placed on the forest officers on the ground. The administration of the national forests necessarily centers in the Washington office, to which are attached certain higher officers engaged in general direction and inspection of the work; but for promptness and convenience of field administration eight national forest districts have been established, seven in the States and the eighth in Alaska. Each district is under the direct charge of a district forester, who has associated with him such technical assistants as are necessary for the conduct of the work.

Altogether there are 160 national forests, averaging nearly 1,000,000 acres each. In charge of each forest is a supervisor. In some cases he is assisted by an assistant supervisor. The forests are divided into districts, each in charge of a district ranger, who is responsible for the protection of this area and for the conduct of the business upon it. During the summer guards are employed to supplement the regular force. In addition to this executive force there are technical assistants to aid in marking and scaling timber, in timber estimating, in surveying, in grazing, in land classification, and in other work which requires special technical knowledge and ability.

Constant additions are made to the national forests through purchases of privately owned forest lands under the provisions of the Weeks law and the Clarke-McNary Act. Annual appropriations are made for such purchases. The appropriations have varied greatly since 1911, the first year the Weeks law became effective, when Congress approved the sum of $2,000,000 for this purpose. For the years 1926 and 1927 an annual amount of $1,000,000 was made available. These funds are expended chiefly in the more mountainous regions east of the Mississippi River, particularly in the White Mountains of New Hampshire, the Alleghenies of Pennsylvania, and the southern Appalachians. More recently a purchase area has been established in lower Michigan and another in northeastern Minnesota. On this work a considerable number of land examiners and surveyors are constantly employed.

The following table shows the classification of the force on the national forests on June 30, 1926, not including men engaged in general administration in the district offices:

Supervisors	145
Assistant supervisors	94
Rangers	986
Guards	2,330
Technical foresters and range examiners	147
Timber and mining experts, engineers, land examiners, etc	145
Clerks	251
Total	4,098

On the national forests the task first in time and importance has been that of protecting the forests and organizing their business administration. Protection of the forests from fire is of fundamental importance. Without adequate protection all other efforts directed toward increasing the productivity of the forest may be entirely nullified. Every effort has therefore been directed toward this objective. Much of the national forest acreage has been brought under the direct observation of lookout stations, each having direct wire connections with its forest headquarters. These are supplemented with patrolmen covering portions of so-called "blind" territory, or regions not covered by the lookout system because cut off from observation by intervening ridges. The reports of the lookout men are promptly acted upon by guards or rangers, who hasten to the location of each fire as reported by telephone. Furthermore, all the permanent forest improvements, such as roads, trails, and telephone lines, have been planned with the specific object of making them of the greatest use in protecting the forests from destruction by fire.

The use of the forests by the public is constantly increasing. During the calendar year 1925 it is estimated that 14,000,000 people, the

majority of whom were campers, travelers, hunters, and fishermen, visited the national forests. This increased use has necessarily somewhat intensified the fire problem and in addition has necessitated the handling of an immense amount of current business. The large volume of business involved in the disposal of forage and forest products and in the use of the land calls for constant and painstaking supervision. During the calendar year 1925, a total of $1,506,215 was received for 29,639 permits for grazing 6,162,263 sheep, 1,538,942 cattle, 57,904 horses, 19,795 goats, and 846 hogs; $3,334,959 for 1,183,167,000 board feet of timber cut under sales; $63,234 for water-power permits issued before Congress created the Federal Power Commission; and $264,191 for 16,213 special-use permits, including 8,069 permits for residences or summer homes. In addition to the special uses which yielded a revenue, 14,587 permits were issued for free use.

All these different lines of work are handled by the regular administrative force under the immediate direction of the supervisor. From the very beginning an effort has been made to apply the best forestry practice possible under existing conditions, and the more technical phases of the work have accordingly been handled as far as practicable by the men with a technical education, the junior foresters. These men have had to perform such duties as mapping and estimating the timber on the forest, marking the trees to be removed in timber sales, raising stock at nurseries for field planting, and reforesting treeless areas by planting. The rangers also are called upon to do work of this character in addition to their regular protection and administration duties. Many of them have become very proficient in such work, of which there is more and more to do as the business of the national forests increases.

The second step in the development of the forests has been the preparation of detailed plans for the administration and use of the resources of each forest. Such plans require a sound technical training for their preparation and execution. Their perfection will be achieved only through the painstaking work of years, but already the results of better management clearly justify their application.

RESEARCH OR INVESTIGATIVE WORK

The primary objectives of the research activities of the Forest Service are to obtain the scientific foundation for such management of forest lands as will help insure (1) supplies of timber and other essential forest crops suitable in quality and ample in quantity for national needs; (2) regulation of stream flow, prevention of erosion, furtherance of public health and outdoor recreation, increase in fish, game, and other wild life, climatic and scenic benefits, etc.; (3) forage crops of the best kind in greatest quantity and the fullest utilization of these crops consistent with (1) and (2); (4) the fullest and most profitable use of forest land. The whole means the better use of a more attractive country by a better citizenship.

This research includes four main classes. Research in silviculture has to do with the growing of timber crops and with their management; that in forest-range management with producing and utilizing forage crops so far as may be consistent with the growing of timber; that in forest products with reduction of waste and with effective

utilization of wood and other forest products; that in forest economics with the facts and principles on which are based the policy of forest landowners.

Silvicultural research is being conducted at regional forest experiment stations, of which 11 have been established in continental United States, or 1 in each of our important forest regions. The Forest Service plans eventually to establish similar stations in Alaska and in our tropical possessions in the West Indies. These stations investigate such problems as the best methods of cutting timber in the different forest types in order to procure natural reproduction easily and successfully, methods of artificial reforestation, forest growth and yields, and methods of protection against fire. The present force engaged in this work is about 70 men. About 50 additional temporary assistants, chiefly forest-school students, are employed during the field season.

Grazing research is being conducted at three western range reserves and by a limited number of men attached to the district offices. As soon as possible such work will be expanded to cover all western forest ranges and possible eastern forest ranges also. Such problems as the following are investigated: Means of producing maximum forage crops; the carrying capacity of range lands and systems of range management which will result in maximum utilization of the forage without interfering with timber growing. About 10 technical men are permanently employed in this class of investigations.

Forest-products investigations are centered at the Forest Products Laboratory at Madison, Wis. Investigations in forest products are also carried on at four products offices in three western national forest districts and in Washington. Such problems as the following are being investigated: The determination of the strength properties of wood, the fundamental principles which should govern construction and design where strength is a factor in the use of wood, methods and materials for the preservative treatment of wood, the use of wood in pulp and paper making, the distillation of wood, the seasoning of wood, the reduction of waste in logging, the manufacture of lumber, and the reuse of lumber. The number of technical men permanently employed in forest products work is about 90.

Investigations in forest economics are now centered in Washington, D. C., and in New Haven, Conn., and consist of investigations on such subjects as forest taxation, existing timber supplies and current demands, stumpage prices and prices of forest products, distribution of forest products, and various problems of forest-land use. The number of permanent technical employees is about 12.

For permanent employment in research the Forest Service wants men with advanced training, preferably with a doctor's degree or an equivalent, and will work toward this end as rapidly as such trained men are available. The various phases of forest research require as the best foundation a broad training in forestry regardless of whether the investigator is to deal with silviculture, grazing, forest products, or economics. Beyond this the advanced training may be in any one or more of a large group of biological or other sciences such as plant physiology, ecology, soil science, genetics, zoology, organic chemistry, colloid chemistry, physics, engineering, economics, and mathematics.

Wherever possible men are encouraged to spend a limited time in the administrative organization either as forest rangers or as junior foresters in order to obtain a familiarity with actual forest practice before entering permanently upon research assignments. In employing men as temporary assistants preference is given to forest-school students and others who are anxious to specialize later in research.

Forest research offers an opportunity equal to that of any other activity within the Forest Service for constructive work having a high public-service value. It deals almost altogether with new problems on which work in the United States is barely beginning. No other phase of forestry offers a more attractive career for men having the creative impulse.

PUBLIC RELATIONS OR EXTENSION WORK

The third division of the Government's forestry work deals with public relations or extension. Its function is primarily educational. It takes the findings or discoveries of research and makes them available for use generally. It is the medium through which the Forest Service cooperates with the various States, with municipalities, with individuals and companies owning forest lands, with lumber manufacturers and consumers, and with forestry associations, educational institutions, foreign countries, and the forest and wood using and consuming public generally.

Almost without exception the men employed by the Forest Service in public-relations work are men who have had considerable experience either in forest administration or investigation and have shown a special aptitude of expression or special talent for public service and instructional work. As in research and national forest administration, the best educational foundation for such work is a thorough training in forestry. With such an educational foundation plus a background of practical experience in forestry work, the man who demonstrates a special capacity to present lessons of forestry clearly and convincingly to the public, either through the written or spoken word or by visual education through such mediums as exhibits or motion pictures, finds his most interesting and useful field of effort in this branch of Forest Service work. Though the number of men so employed is relatively small, their contacts with the entire national field of forestry are many and intimate, and their influence on State and private forest activities and policies is important and far-reaching.

STATE WORK

Forestry work in the States has made notable progress in the past few years. There are now over 35 States employing foresters in various capacities, the number of trained men thus engaged being over 100 per cent greater than it was five years ago. In many of tthe States the position of State forester entails much responsibility, as he is the directing head of a large organization and has under his control the annual disbursement of large appropriations.

The character of work which a State forester has to do depends upon the stage of development of forestry in his particular State. In one where forestry is just beginning to receive attention his first

efforts must be largely along educational lines. His chief task is to develop a forest policy for the State and to educate the people to a better handling of the forests within its borders. He must study the needs of the State and then go before the people and show them what must be done to put into effect the policy which he has formulated. He usually has to make a great many public addresses, issue bulletins, write articles for the magazines and newspapers, and in every other way possible bring his message to the people. He must obtain legislation and appropriations, and ordinarily has but little opportunity for technical forest work.

On the other hand, in those States where there is already a settled forest policy the State forester's work is of a very different character. His major activities are usually fire control, forest planting, educational work, management of State-owned forests, and forestry extension, which includes advice and assistance both in the field and through correspondence to private owners of woodlands.

Thirty-three States are now cooperating with the Federal Government in the prevention and control of forest fires. This activity alone has furnished employment to many foresters, and an active demand continues for men with the proper training and experience in fire-control work.

The propagation and distribution of planting stock by the States has received a decided impetus of late, and yet in many of the States it is but in its infancy. Thirty-three States and Porto Rico are cooperating (1927) in this work with the Federal Government. A substantial number of trained men are now employed, and there is every reason to believe that this number will be increased as time goes on.

Forestry extension work has also recently come into greater prominence, materially widening the employment field for foresters in the States.

MUNICIPAL WORK

The salaries of State foresters range from $3,000 to $8,000 a year, with an average salary of about $4,000. Usually their assistants receive from $1,800 to $3,000 a year.

With the constant enlargement of State forestry appropriations and a greater increase in the number of States developing forestry organizations it is evident that the demand from this source for trained foresters will continue for an indefinite period.

A new field of employment for trained foresters is opening up through the acquisition of city forests by municipalities. In addition to parks for recreational purposes and purchases of forested watersheds for the protection of sources of domestic water supplies, many cities, are acquiring forest lands for investment and development purposes. The proper management of such properties naturally requires the services of trained foresters. In fact, properly to supervise city forests, municipal watersheds, and city parks, which also present forest problems, a sound training in forestry seems indispensable.

PRIVATE WORK

Though Federal and State employment and educational institutions and semipublic associations will doubtless continue to take the

lead in research and extension, in the long run the great field of work for professional foresters in the actual management of forests will be in private work. Fully four-fifths of the total stand of the merchantable timber in the 48 States and about the same proportion of the good timber-producing land is in private ownership, and this fact alone clearly indicates a large and fruitful field of opportunity for the trained forester. In this field the growth of the profession in numbers and influence may reasonably be expected to be great and enduring.

Private owners may be classified in a general way as lumber companies, including pulp and paper manufacturing companies, and other large manufacturers of wood products; public-service corporations, such as railroads and water companies; recreation and hunting clubs; mining companies; large private estates; and farmers and other small woodlot owners.

So far the principal activities in forestry on the part of large lumber companies have been in protecting their holdings from fire. In northwestern Montana, northern Idaho, Washington, Oregon, and northern Californina large lumber companies have taken a very progressive attitude toward the question of fire protection. They have organized timber-protective associations and have employed trained men to put into effect systematic plans for fire detection and suppression. Similar action has been taken by some of the lumbermen in the Northeast, notably in Maine and New Hampshire. In other parts of the country the work of fire protection has been largely carried on by the individual lumberman, and, except where organized under the cooperative authority of the Clarke-McNary law, has been for the most part spasmodic and unsystematic. Nevertheless there is a constantly growing appreciation of the need for such work. Systematic fire protection for practically all stands of merchantable timber on the part of lumber companies in nearly all parts of the country will soon be an accomplished fact; but equally effective protection of young growth—essential to future industry and prosperity—is more remote, except as brought about under State and Federal cooperation as authorized by the Clarke-McNary law.

Within the past decade many lumber companies have begun to look farther than mere fire protection in establishing forestry practice. Plans for permanent operations based upon sustained yield are entering into the picture. In California members of the Humboldt Redwood Reforestation Association, operating in a region of optimum growth for that species, plan to perpetuate their operations by replanting their cut-over lands as lumbering progresses. Other notable examples might be cited in the Pacific Northwest, in the Northeast, in Arkansas, in Louisiana, in Mississippi, in Virginia, North Carolina, and the extreme Southeast. Many of these concerns furnish permanent employment to technical foresters, and others have called in consulting foresters for advice on special problems of management. Probably no class of timber owners has shown a greater appreciation of the beneficial results obtainable by adopting sound principles of forest management than the large paper and pulp manufacturing companies of the East. This is doubtless due to the fact that pulp wood can be grown on a shorter period of rotation than most wood products, and the beneficial results of selection cut-

ting, fire protection, or forest planting are realized in a very few years. Some of these companies are even undertaking extensive planting operations.

More and greater opportunities than ever before exist in the lumber and allied industries, such as the paper and naval stores industries, for practical foresters with business ability. The forester who enters the lumber business must be prepared to estimate standing timber, appraise stumpage, determine the best method of cutting, estimate the future growth, lay out logging roads and railroads, reduce waste, increase utilization, and participate in actual lumbering and milling operations. There is already a keen demand for the services of foresters who have demonstrated their fitness for practical work of this character. Training for such work can only be gained by entering the lumber business at the bottom and learning its practical and administrative details in a long and exacting apprenticeship. This field, however, offers probably the greatest opportunity for trained foresters in the future, both as to the number of men who will be required and the ultimate rewards for success, in salary and in responsibility.

There is also a broad field among public-service corporations which own timberlands. Most railroads own a certain amount of forest land, and the holdings of some, as the Northern Pacific, the Southern Pacific, and the Santa Fe, are very extensive. A few of these corporations have already adopted a consistent and permanent policy of holding their timberlands and are introducing systematic forest protection. The next logical step would seem to be the inauguration of a system of forest administration somewhat similar to that on the national forests. Some of the eastern railroads have considered the acquisition of forest lands, with tree planting wherever necessary, for the production of ties and other wood supplies. So far the number of foresters employed by railroads is small, but the field is there and ultimately will call for trained men.

There are also opportunities no less inviting in the utilization and mercantile fields of the lumber business. Though a knowledge of forestry is not essential to a retail or wholesale lumber dealer, a knowledge of woods and their properties gives the dealer an opportunity to speak with authority on the technical qualities of the woods and materials handled. In the field of utilization, the growing use of wood in all sorts of products, as in the manufacture of paper and artificial silk, and the increasing use of such equipment as dry kilns and preserving plants to procure better utilization are creating opportunities for specialists in the industrial phases of wood utilization. This field, which is growing as wood becomes higher in price and as supplies become less plentiful, also offers opportunity for consulting work in the use of forest products, in saving waste, and in creating new uses for present day little-used species, or in developing satisfactory substitutes for higher-priced woods. The number of men engaged in work of this kind is small, but it is bound to increase.

Many water companies hold extensive tracts of timberland on the drainage areas from which their water supplies are derived. These companies have for the most part adopted the definite policy of maintaining such land in forest growth. They will unquestionably

in many cases find it to their advantage to employ professional foresters to keep the forest cover in the best possible condition while at the same time yielding a revenue.

Frequently mining companies own lands that are covered with tree growth. Many of the mining companies in the southern mountains, especially coal-mining companies, own considerable areas of land which they wish to hold for mineral development and also for the production of wood and timber for use in the mines. Some of these companies have already interested themselves in the question of treating timbers with chemical preservatives and others have taken up the problem of conservative management of the forest lands which they own.

Another class of private owners consists of those who have acquired forest property for hunting and other recreation purposes. Some of these owners are already beginning to practice forestry and are employing foresters to take care of their property.

At present relatively few large tracts of land in private estates are managed under forestry principles with a technical forester in charge. More often the work on the ground is taken care of by a resident ranger or woods foreman, and where any technical work is done it is directed or supervised by a consulting forester, who visits the tract only at intervals. Most of the forestry work so far done on private estates has been, and except in the case of the largest owners will probably continue to be, of this character. There are now a number of private firms and individuals who do work as consulting foresters.

This kind of professional work is steadily increasing in volume as the principles of forestry become better known and more generally recognized in the management of private woodlands. Work as consulting foresters is the natural goal of many of the more mature and experienced men who have acquired a solid footing in the profession. It also offers opportunities for the employment of younger men as assistants and members of field parties. Some of the larger firms of consulting foresters now established require a permanent staff of trained men to carry on their work. The number of such openings to foresters entering the profession will undoubtedly be materially increased in the future.

Artificial reforestation by private owners is steadily assuming increased importance. Many of the States, in cooperation with the Federal Government under the provisions of the Clarke-McNary law, supply planting stock for farms and small wood lots at a nominal cost, but such cooperative activity can not meet the demands of large timber landowners for reforestation on an extensive scale and was not designed to do so. Meanwhile interest in reforestation for timber-production purposes is steadily increasing, and accordingly there is a profitable field for professional foresters in collecting seed and raising nursery stock either as a business by itself or in connection with other forestry work.

The future development of private forestry in this country will be largely influenced by favorable legislation with respect to forest taxation, by State cooperation in fire protection, and by the individual work of the foresters themselves. As foresters demonstrate to their employers that their work is profitable they will find, without question, plenty of employment. The field is there and it is

an enormous one. It remains only to be developed. There is little question that the foresters who are being turned out in increasing numbers will develop this field of opportunity, particularly when its development is both an individual and a national necessity.

The compensation in private forestry depends entirely upon the earning capacity of the individual. Ordinarily foresters in private employ under salary are paid for their technical work at a somewhat higher rate than public forest officers in the same grade of work, higher salaries being necessary to make private work more attractive than public. Furthermore, where the forester works into a regular business, as, for example, in the lumber business, his remuneration will depend more upon his business capacity and what he can do for the company in a business way than upon his technical attainments. Without any question some consulting foresters will be able to carry on a very prosperous business, especially when they have established a national reputation which will cause a demand for their services in the solution of particularly important problems.

TEACHING AND RESEARCH

Teaching offers many opportunities to the technical forester. While the field is a rather limited one, nevertheless there are many calls for men with practical woods experience and ability as teachers. The comparatively large number of schools in this country now offering complete courses in forestry has demanded more men with suitable training and experience than could be found, and it is not likely that this field will soon be overcrowded. The teacher of forestry usually has the advantage of being able to carry on original studies in connection with his regular school work.

Closely associated with educational work is research work. This field is unquestionably an important one which offers attractive opportunities to suitably trained men. The profession and the economic needs of the Nation both urgently require that the research now being carried on at Government expense be supplemented with and checked by investigative work in educational institutions and endowed schools of science and by individuals of special attainment. The Forest Service is far from having a monopoly of forest-research opportunities. The field is a wide-open one. Carefully conducted scientific investigations must lay the foundation for all practical woods work, and the men who make these investigations are really guiding the development of forestry. These studies must be not only along lines which have always been recognized as belonging to forestry but also along such lines as forest entomology, pathology, meteorology, biology, and soils. Unquestionably for investigations of this character a technical and practical training in forestry is of special value if not absolutely essential to success. The compensation for research work in forestry will usually be commensurate with that of other scientific work, usually somewhat less than that of high-grade administrative work and still less than the rewards of successful business management, but will undoubtedly always be sufficient to afford a comfortable living supplemented by the rewards of intellectual accomplishment and mental satisfaction.

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